(1)

INITIAL APPRAISAL

AD-A219 759

SECTION 205 FLOOD DAMAGE REDUCTION STUDY

MISSISSIPPI RIVER

CITY OF SABULA, IOWA

MARCH 1990

US Army Corps
of Engineers
Rock Island District

DEPARTMENT OF THE ARMY
ROCK ISLAND DISTRICT. CORPS OF ENGINEERS
CLOCK TOWER BUILDING—P.O. BOX 2004
ROCK ISLAND. ILLINOIS 61204-2004

REPLY TO
ATTENTION OF

CENCR-PD-F

INITIAL APPRAISAL

SECTION 205 FLOOD DAMAGE REDUCTION STUDY
MISSISSIPPI RIVER, CITY OF SABULA, IOWA

MARCH 1990

ACKNOWLEDGEMENT

Primary study team personnel who are familiar with the technical aspects of the study are listed below:

STUDY MANAGEMENT:	Karen Bahus
PLAN FORMULATION:	Karen Bahus Fred Schwada
ECONOMIC ANALYSIS:	Dan Fetes
ENVIRONMENTAL AND CULTURAL RESOURCES:	Charlene Carmack
HYDROLOGY AND HYDRAULIC STUDIES:	David Martin

SYLLABUS

In a letter dated July 7, 1989, Mr. Mike Cotton, Chair of the Sabula Waterfront Commission, requested that the feasibility of possible solutions to reduce flood damages from the Mississippi River in Sabula, Iowa, be investigated under the Corps of Engineers' continuing authority of Section 205 of the 1948 Flood Control Act, as amended.

The study area encompasses the riverbank of the Mississippi River in Sabula from about river miles 534.5 to 535.8. An existing Corps of Engineers levee system, constructed in 1957, surrounds Sabula, except along this portion of the city. During flood periods, emergency flood fighting measures are undertaken along the riverfront to assure minimization of flood damages.

The purpose of this Initial Appraisal is to determine if there is sufficient Federal interest to further develop flood damage reduction measures that would assure minimization of flood damages to the city of Sabula, Iowa.

This Initial Appraisal concludes that additional flood damage reduction measures for the city of Sabula, Iowa, are not economically feasible, and that further Federal participation under the authority of Section 205 is not warranted.

INITIAL APPRAISAL

SECTION 205 FLOOD DAMAGE REDUCTION STUDY
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INITIAL APPRAISAL

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SECTION 1 - INTRODUCTION

This report presents the results of a preliminary evaluation of possible solutions to assure the minimization of flood damages from the Mississippi River to the city of Sabula, Iowa. This investigation was requested in a letter signed by Mr. Mike Cotton, Chair of the Sabula Waterfront Commission, dated July 7, 1989 (see Appendix C - Pertinent Correspondence).

STUDY AUTHORITY

The Corps of Engineers has authority to construct small flood control projects under certain conditions without the specific authorization of Congress. The authority for this study is Section 205 of the 1948 Flood Control Act, as amended, which is presented below:

> The Secretary of the Army is authorized to allot from any appropriations heretofore or hereafter made for flood control, not to exceed $40,000,000 for any one fiscal year, for the construction of small projects for flood control and related purposes not specifically authorized by Congress, which come within the provisions of Section 1 of the Flood Control Act of June 22, 1936, when in the opinion of the Chief of Engineers such work is advisable. The amount allotted for a project shall be sufficient to complete Federal participation in the project. Not more than $5,000,000 shall be allotted under this section for a project at any single locality. The provisions of local cooperation specified in Section 3 of the Flood Control Act of June 22, 1936, as amended, and in Public Law 99-662 (Water Resources Development Act of 1986) shall apply. The work shall be complete in itself and not commit the United States to any additional improvement to ensure its successful operation, except as may result from the normal procedure applying to projects authorized after submission of preliminary examination and survey reports.

STUDY PURPOSE AND SCOPE

As shown on plate 1, the city of Sabula is located in Jackson County on the eastern edge of Iowa. The city is almost entirely surrounded by water, with the Mississippi River to the east and Sabula Lakes to the west. Sabula is connected to the mainland by causeways and bridges. The study area encompasses the riverbank of the Mississippi River in Sabula from about river miles 534.5 to 535.8.

This Initial Appraisal evaluates whether there is sufficient Federal interest to further develop flood damage reduction measures that would assure the minimization of flood damages to the city of Sabula, Iowa. It is the initial investigation into the problems caused by Mississippi River flooding in Sabula. Its purpose is to identify opportunities for alleviating flood damages and to determine whether more detailed study is warranted. To warrant further study, at least one plan must be shown to be in the Federal interest.

SECTION 2 - PLAN FORMULATION

GENERAL

The plan formulation procedure is a process designed to identify and evaluate possible solutions to existing and projected problems and needs. For an initial appraisal, the plan formulation procedure is limited to determining if there is at least one solution which warrants further analysis in a reconnaissance study.

ASSESSMENT OF WATER AND LAND RESOURCE PROBLEMS AND OPPORTUNITIES

EXISTING CONDITIONS

General

The Sabula Flood Control project was authorized in the Flood Control Act of 1954. The project was constructed by the Corps of Engineers to protect the city of Sabula from the 100-year flood event on the Mississippi River, with 3 feet of freeboard. The project consisted of raising existing levees and constructing several reaches of new levee and drainage works (see plate 1). The project was completed in December

1957. Currently, the existing levee system provides about 2.5 feet of freeboard for the 100-year flood event.

The existing levee system surrounds Sabula, except along the riverfront of the Mississippi River, where existing land surface elevations are approximately at the 100-year flood elevation. During flood periods, emergency flood fighting measures are undertaken along the riverfront to assure the minimization of flood damages. The problem is further complicated by continuing bank erosion along the riverfront and near the North Levee tie-off.

In early 1988, this bank erosion problem was investigated by Rock Island District personnel under the authority of Section 14 of the Flood Control Act of 1948, as amended. At that time, it was determined that there was no immediate threat to critical facilities due to the bank erosion. Sabula was asked to monitor the erosion problem and to contact the Rock Island District should the situation change. This determination is still valid concerning the Section 14 aspects of the study area.

Hydrologic and Hydraulic Conditions

The climate of the area is typically continental with changeable weather and a wide range of temperature extremes. The mean annual temperature at Sabula is 48 degrees Fahrenheit (F), with monthly averages varying from a low of 18 degrees F in January to a high of 72 degrees F in July. The average annual precipitation at Sabula is 34.9 inches, with a normal annual snowfall of 34.1 inches.

The Mississippi River Basin at Sabula has a drainage area of 85,200 square miles. The area around Sabula is characterized by high bluffs on both sides of the river, resulting in flashy local runoff, while the large total drainage area makes it possible for the National Weather Service to give at least a 3- to 7-day warning for major floods.

The flood of record at Sabula, Iowa, occurred in April 1965 and was an estimated 85-year event (1.2 percent probability). The existing flood protection project prevented major damages. A major flood occurred in 1969 and was an approximate 20-year event (5 percent probability). Emergency sandbagging was placed on Sabula's downstream riverfront area, which helped to protect against wave-wash damage. This was later covered and seeded for additional permanent flood protection.

Additional information concerning hydraulic and hydrologic conditions is found in Appendix A - Hydrology and Hydraulics.

Economic Conditions

The city of Sabula, with a 1989 estimated population of 850, is located on the right bank of the Mississippi River in eastern Iowa. This Jackson County city is served by U.S. Highways 52 and 67 and State Highway 64. The local area economy is agricultural-based, with some commercial and light-industrial enterprises. The nearest industrial center is the Davenport, Iowa-Moline, Illinois, metropolitan area (pop. 380,000), which is located about 50 miles to the south of Sabula.

The study area has a mixture of residential, commercial, and public properties. Businesses represented in the area include gasoline and auto service, banking and financial services, grocery and convenience stores, funeral home, taverns, motel, electrical component assembly, and gift shops. Public properties include police/fire/administration building, library, post office, school buildings, and public works facilities.

Additional information concerning economic conditions is found in Appendix B - Economic Analysis.

Environmental Conditions

The study area is primarily urban in character. Terrestrial resources in the study area are rather limited due to the extent of development. Several residential structures, as well as a small city park, are located in the vicinity of the proposed levee alignment. The primary aquatic resource in the study area is the Mississippi River. Valves of several species of freshwater mussels were observed during a site inspection of the study area in September 1989.

Foundations of two structures dating to the late 19th or early 20th century were found during the site inspection. Examination of city plats and an article from the Bellevue Herald Leader indicate that the foundations may be the remnants of an ice house and packing plant. Because the city itself dates to 1835, there may be additional historic or archeological properties, as yet unidentified, in the project area.

Future project planning would require more detailed investigation, and National Environmental Policy Act (NEPA) documentation, of the cultural and natural resources of the study area.

EXPECTED FUTURE CONDITIONS

If no Federal action is taken, the flood damages in Sabula would continue to be reduced through local efforts. Since flood forecasting on

the Mississippi River is quite accurate and flood warning time ranges from 3 to 7 days, the city could continue to sandbag low spots in their existing levee system and along the riverfront.

In January 1974, Sabula began participation in the Emergency Flood Insurance Program. The city was converted to the Regular Flood Insurance Program on November 19, 1987. In November 1987, a Flood Insurance Study for the city of Sabula was published by the Federal Emergency Management Agency.

PLANNING OBJECTIVES

NATIONAL OBJECTIVE

The national objective of water and related land resources planning is to contribute to economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to the National Economic Development (NED) are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct benefits that accrue in the planning area and the rest of the Nation, and include increases in the net value of those goods and services that are marketed, and those that may not be marketed.

The plan formulation process to accomplish flood damage reduction is formulated and directed by the national planning objective:

> National Economic Development (NED). To enhance the national economic development by increasing the value of the Nation's output of goods and services and by improving the national economic efficiency.

SPECIFIC OBJECTIVE WITHIN THE STUDY AREA

Based on an analysis of problems and needs in the study area, the study has identified as a specific planning objective the need to reduce economic losses due to flooding from the Mississippi River in the city of Sabula, Iowa.

PLANNING CONSTRAINTS

The planning process provides the basis for selecting one of the developed plans and, if appropriate, recommending Federal participation to

implement the plan. The selected plan is the one that is in the best public interest regardless of whether or not it is within the existing authority of the Corps of Engineers to implement.

The planning constraints which have been developed for this study are as follows:

> This study is constrained by applicable laws of the United States and by the State of Iowa, all executive orders of the President, the Water Resources Council's Principles and Guidelines, and all engineering regulations of the Corps of Engineers.

DEVELOPMENT OF PLANS

DESCRIPTION

As flood damage reduction measures, levees and floodwalls serve the same purposes. The determination as to which is used is governed by the existing economic and physical conditions. Costs involved with construction of a concrete floodwall are significantly higher than those associated with an earthen levee.

Two plans were investigated in order to provide 100-year flood protection along the riverfront of the Mississippi River in Sabula, Iowa. Plan A consists of a 3-foot-high freeboard levee extending from the existing levee along Iowa Avenue (North Levee) to the existing levee (East Levee) near Quarry Street (see plate 2). A short section of concrete floodwall would be needed near the public boat ramp, as well as three sandbag road closures. For this plan, six homes, three mobile homes, and one business would require relocation out of the levee alignment. The riverward slope of the levee would require riprap to protect the levee from erosion. Preliminary costs for this plan are shown on table 1.

Plan B consists of a similar levee and floodwall alignment as described for Plan A. However, in order to avoid relocation of the homes and business located along the riverfront, a 3-foot-high road raise was considered along Iowa Avenue to Bank Street (see plate 3). One mobile home still would require relocation, and two sandbag road closures would be required. Preliminary costs for this plan are shown on table 2. Typical sections for both plans are shown on plate 4.

Table 3 summarizes the benefits and costs associated with both plans. As shown on table 3, Plan A was found to have a benefit-to-cost ratio of 0.13 to 1, and Plan B a benefit-to-cost ratio of 0.24 to 1. Therefore, both plans lack economic justification.

TABLE 1

Plan A
Preliminary Cost for 100-Year Protection
Sabula, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee:				
Stripping	4,100	yd^3	2.50	10,250
Embankment	25,600	yd^3	4.00	102,400
Slope Protection:				
Riprap	9,300	yd^3	22.00	204,600
Bedding	3,100	yd^3	19.00	58,900
Floodwall:				
Excavation	300	yd^3	3.60	1,080
Backfill	350	yd^3	2.70	945
Concrete	93	yd^3	260.00	24,180
Seeding:	2	acre	2,000.00	4,000
			SUM =	406,355
			Contingencies (25%) =	101,588
			SUM (Rounded) =	507,900
			Engineering & Design (8%) =	40,600
			Supervision & Administration (6%) =	30,500
			Rights-of-Way & Relocations =	455,400
			TOTAL PROJECT COST	$1,034,400

TABLE 2

Plan B
Preliminary Cost for 100-Year Protection
Sabula, Iowa

Item	Quantity	Unit	Unit Cost ($)	Amount ($)
Levee:				
Stripping	2,500	yd^3	2.50	6,250
Embankment	16,000	yd^3	4.00	64,000
Slope Protection:				
Riprap	5,400	yd^3	22.00	118,800
Bedding	1,800	yd^3	19.00	34,200
Floodwall:				
Excavation	530	yd^3	3.60	1,908
Backfill	800	yd^3	2.70	2,160
Concrete	188	yd^3	260.00	48,880
Road Raise:		Job		66,420
Seeding:	1.5	acre	2,000.00	3,000
			SUM =	345,618
			Contingencies (25%) =	86,404
			SUM (Rounded) =	432,000
			Engineering & Design (8%) =	34,600
			Supervision & Administration (6%) =	26,000
			Rights-of-Way & Relocations =	43,800
			TOTAL PROJECT COST	$536,400

TABLE 3

Summary of Preliminary Benefits and Costs
Sabula, Iowa
(100-Year Evaluation Period, 8-7/8 Percent,
January 1990 Prices)

	Plan A	Plan B
Total Existing Flood Control Benefits:	12,500	12,160
Residential	(8,900)	(8,600)
Commercial	(1.400)	(1,360)
Public	(2,200)	(2,200)
Cost Estimates:		
Federal Cost	579,000	492,600
Non-Federal Cost	455,400	43,800
Interest During Construction	46,000	23,800
Total Annual Charges:	96,900	50,700
Interest & Amortization	(95,900)	(49,700)
Operation & Maintenance	(1,000)	(1,000)
Net Annual Benefits:	(84,400)	(38,540)
Benefit-to-Cost Ratio:	0.13	0.24

SECTION 3 - SUMMARY OF INVESTIGATIONS, COORDINATION, AND SPONSOR VIEWS

INITIAL SITE VISIT - AUGUST 23, 1989

Rock Island District personnel met with Mr. Mike Cotton, Chair of the Sabula Waterfront Commission, in Sabula, Iowa. A site visit was made to determine the problems and concerns of the Commission. The main concerns expressed were the need for flood protection along the riverfront and the elimination of the bank erosion along the riverfront and near the North Levee tie-off. Raising the level of flood protection for Sabula was not of interest to the Commission. The Corps of Engineers' authority to perform flood damage reduction studies (Section 205) and emergency streambank protection (Section 14) was explained.

ECONOMIC FIELD INVENTORY - SEPTEMBER 20, 1989

Rock Island District personnel performed a preliminary field inventory of the study area to determine structure types and values; ground and first floor elevations; and flood damage estimates. Environmental personnel also inspected the study area.

PRELIMINARY SURVEY WORK - OCTOBER 18, 1989

Preliminary elevation and topographic data were obtained along the study area by the Rock Island District survey staff. This information was not available and was necessary to determine the existing level of flood protection along the riverfront.

MEETING - DECEMBER 27, 1989

Rock Island District's study manager met with Mr. Mike Cotton in Sabula, Iowa. The two preliminary plans formulated to provide 100-year flood protection for the riverfront were discussed. Mr. Cotton reiterated that there was no interest in developing flood protection measures above the 100-year level. The Commission is specifically interested in developing the riverfront along a section of city-owned property.

SECTION 4 - CONCLUSIONS

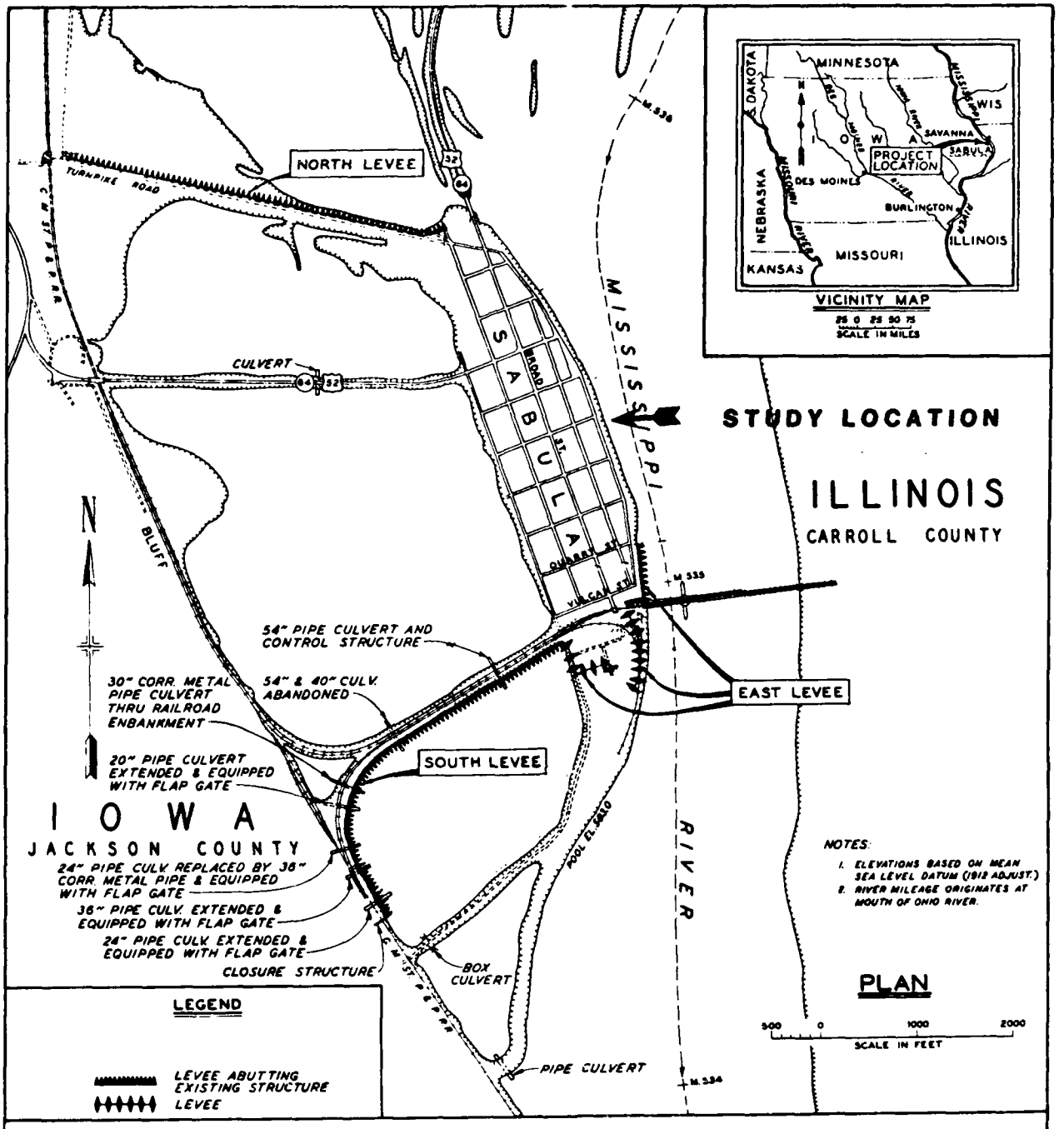
Two preliminary flood protection plans were investigated for the city of Sabula, Iowa. The flood protection extends along the riverfront and ties into the existing North and East Levees. Both plans would assure minimization of flood damages from the 100-year flood event and also would eliminate the bank erosion occurring in the study area. The benefit-to-cost ratio for Plan A was found to be 0.13 to 1, and for Plan B was 0.24 to 1, which does not meet Federal criteria for economic feasibility. Further Federal participation under Section 205 is not warranted.

SECTION 5 - RECOMMENDATION

Based on the findings of this Initial Appraisal, I recommend that further Federal action under Section 205 of the 1948 Flood Control Act, as amended, be terminated for Sabula, Iowa.

Dudley M. Hanson, P.E.
Chief, Planning Division

CORPS OF ENGINEERS U.S. ARMY



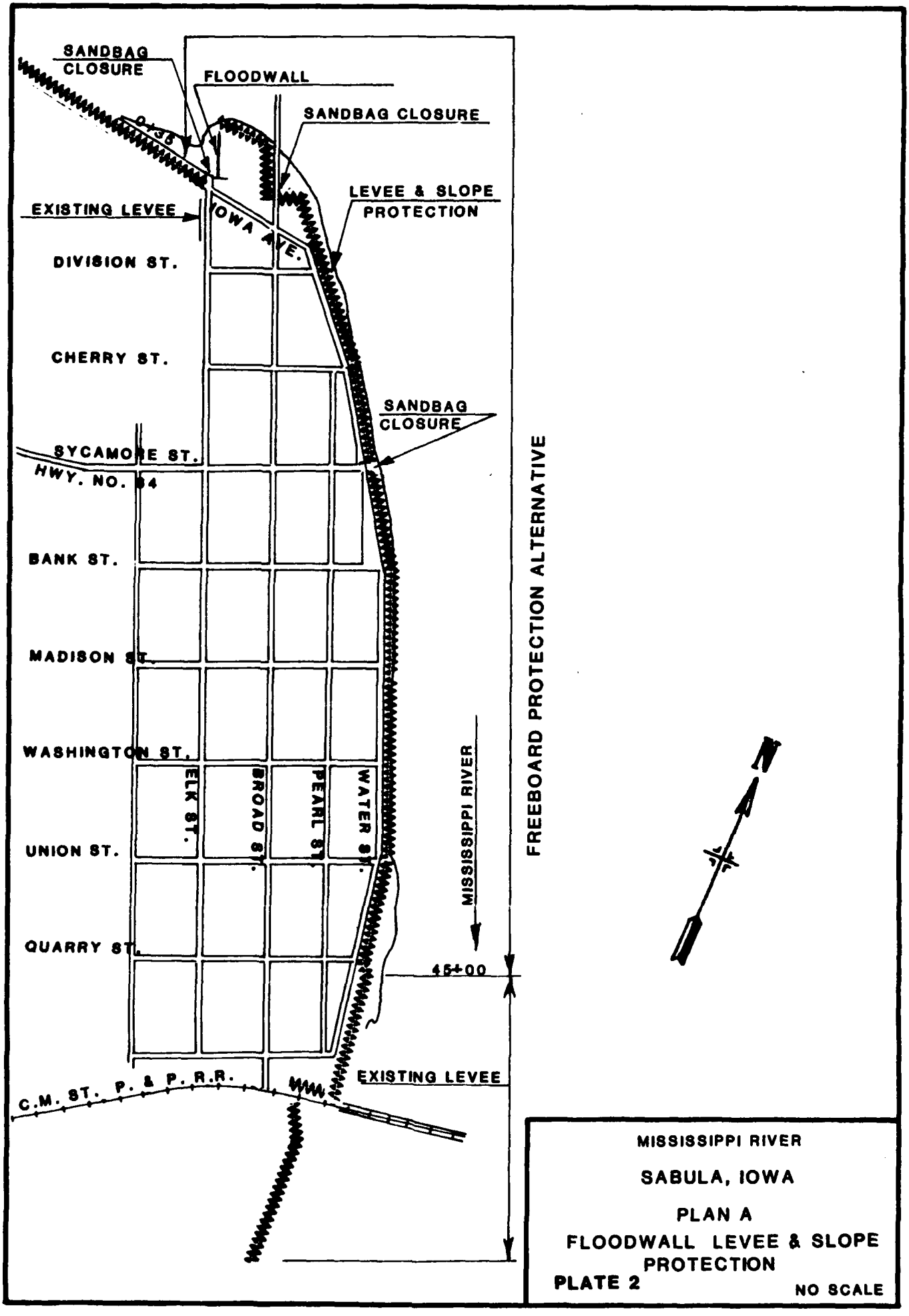
SECTION 205 STUDY

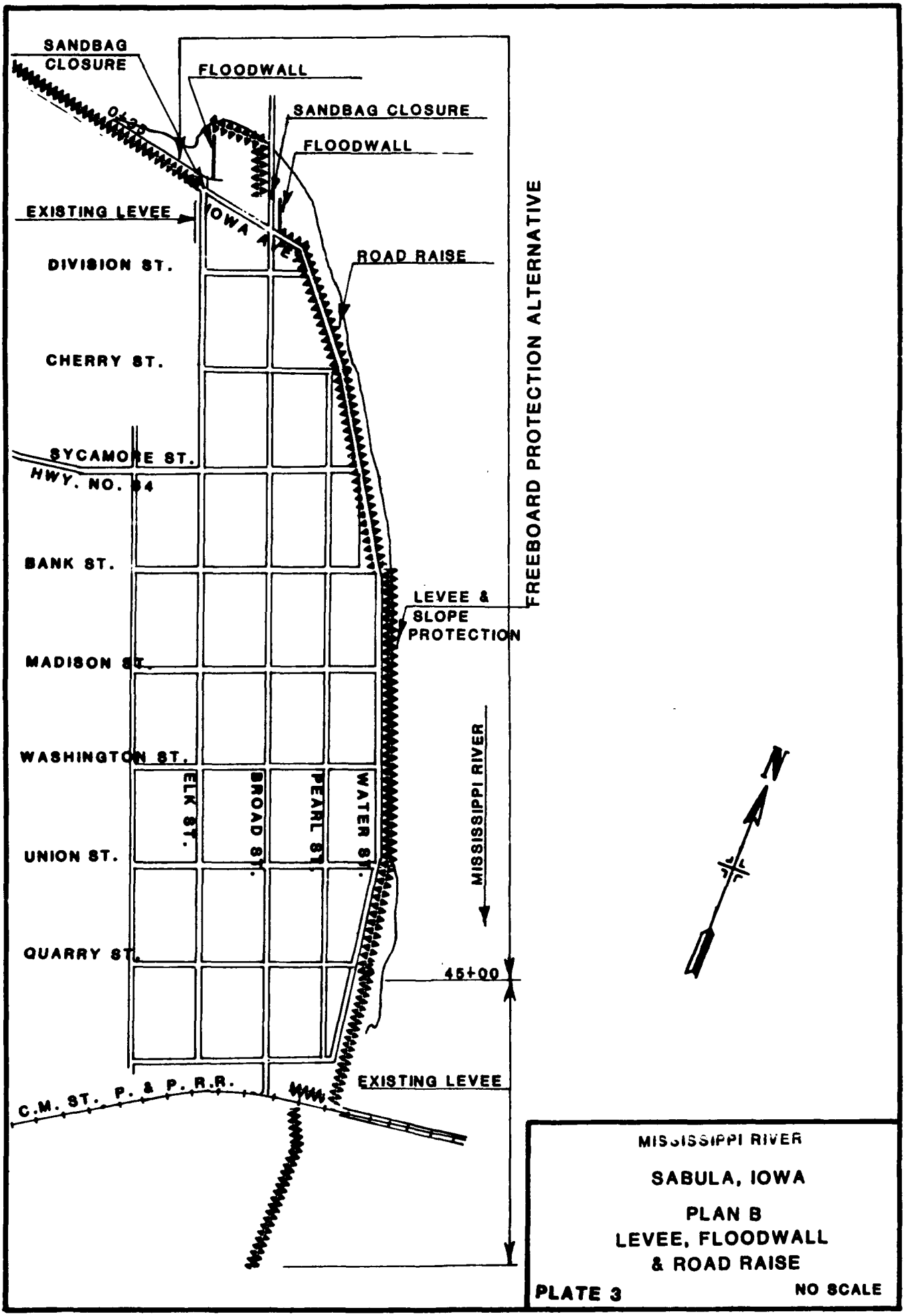
MISSISSIPPI RIVER

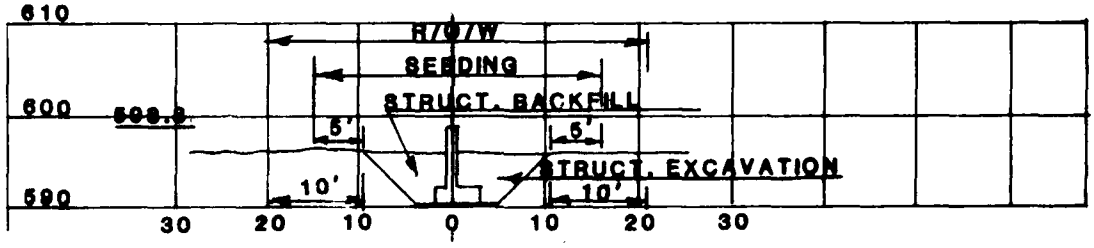
SABULA, IOWA

Study Location And Vicinity Map

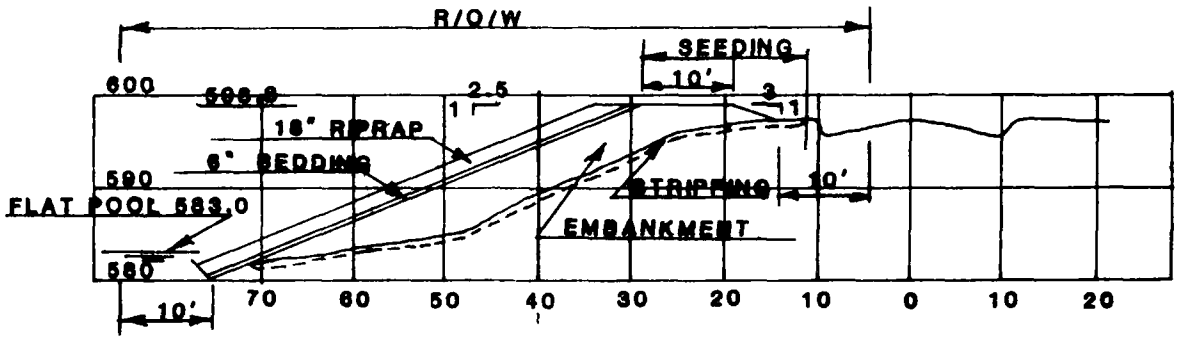
PLATE 1


SANDBAG CLOSURE
FLOODWALL
SANDBAG CLOSURE
LEVEE & SLOPE PROTECTION
EXISTING LEVEE
IOWA AVE.
DIVISION ST.
CHERRY ST.
SANDBAG CLOSURE
SYCAMORE ST.
HWY. NO. 84
BANK ST.
MADISON ST.
WASHINGTON ST.
ELK ST.
BROAD ST.
PEARL ST.
WATER ST.
UNION ST.
QUARRY ST.
MISSISSIPPI RIVER
45+00
FREEBOARD PROTECTION ALTERNATIVE
EXISTING LEVEE
C.M. ST. P. & P. R.R.
MISSISSIPPI RIVER
SABULA, IOWA
PLAN A
FLOODWALL LEVEE & SLOPE PROTECTION
PLATE 2
NO SCALE

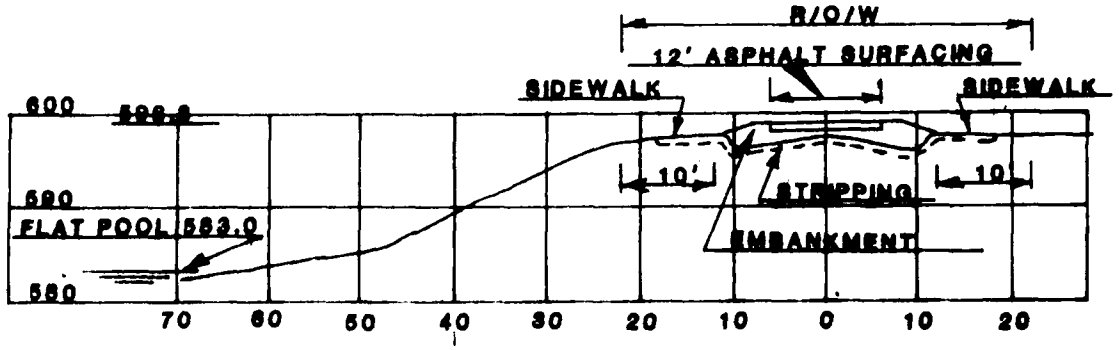

SANDBAG CLOSURE
FLOODWALL
SANDBAG CLOSURE
FLOODWALL
EXISTING LEVEE
IOWA AVE.
ROAD RAISE
DIVISION ST.
CHERRY ST.
SYCAMORE ST.
HWY. NO. 64
BANK ST.
MADISON ST.
WASHINGTON ST.
ELK ST.
BROAD ST.
PEARL ST.
WATER ST.
UNION ST.
QUARRY ST.
C.M. ST. P. & P. R.R.
LEVEE & SLOPE PROTECTION
FREEBOARD PROTECTION ALTERNATIVE
MISSISSIPPI RIVER
45+00
EXISTING LEVEE
N
MISSISSIPPI RIVER
SABULA, IOWA
PLAN B
LEVEE, FLOODWALL
& ROAD RAISE
PLATE 3
NO SCALE



TYPICAL FLOODWALL



TYPICAL LEVEE & SLOPE PROTECTION



TYPICAL ROAD RAISE

MISSISSIPPI RIVER

SABULA, IOWA

PLAN A & PLAN B
TYPICAL SECTIONS

PLATE 4

HYDROLOGY AND HYDRAULICS

APPENDIX A

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APPENDIX A
HYDROLOGY AND HYDRAULICS

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APPENDIX A
HYDROLOGY AND HYDRAULICS

GENERAL

SITE LOCATION

Sabula is located in Jackson County, Iowa, on a small island in the Mississippi River at river mile 535.0. The island is connected to the Iowa shore by four causeways, forming Sabula Lakes on the west edge of the island, with the navigation channel running along the eastern edge. The project area consists of the entire quarter square mile island. The area is mostly urban residential with a few small parks, a marina, and a campground at the southern end of the island. The location is shown on plate 1 of the main report.

CLIMATOLOGY

The climate of the area is typically continental with changeable weather and a wide range of temperature extremes. The mean annual temperature at Sabula is 48 degrees Fahrenheit (F.), with monthly averages varying from a low of 18 degrees F. in January to a high of 72 degrees F. in July.

The seasonal distribution of average annual precipitation is highly favorable to crops, with 70 percent falling during the crop growing season. Most of Iowa's precipitation, both winter and summer, comes from warm, moist air masses moving northward from the Gulf of Mexico. The prevailing southerly winds of spring and summer favor increased rainfall, while the dominance of cold polar air masses in the winter often blocks access of moist, tropical air to the region. The average annual precipitation at Sabula is 34.9 inches, with a normal annual snowfall of 34.1 inches.

MISSISSIPPI RIVER BASIN

GENERAL

The Mississippi River Basin at Sabula has a drainage area of 85,200 square miles. The area around Sabula is characterized by high bluffs on both

sides of the river, resulting in flashy local runoff, while the large total drainage area makes it possible for the National Weather Service to give at least a 3- to 7-day warning for major floods.

FLOOD FREQUENCY AND PROFILES

The flood frequencies and their resulting profiles for this report came from the Upper Mississippi River Water Surface Profiles: River Mile 0.0 to River Mile 847.5 by the Technical Flood Plain Management Task Force, November 1979. The task force used Bulletin #17 guidelines for the flood flow frequency determination and the standard step backwater method of HEC-2 for the profiles (see References A and B). The flood flow frequency curve is shown on plate A-1 and the flood profiles are shown on plate A-2. Plate A-3 is a reproduction of the profile plate from the Upper Mississippi River Water Surface Profile report covering the Sabula area.

REFERENCES

A. Guidelines for Determining Flood Flow Frequency, Bulletin #17, March 1976. U.S. Department of the Interior, Geological Survey.

B. HEC-2 Water Surface Profiles, May 1984. U.S. Army Corps of Engineers, Hydraulic Engineering Center.

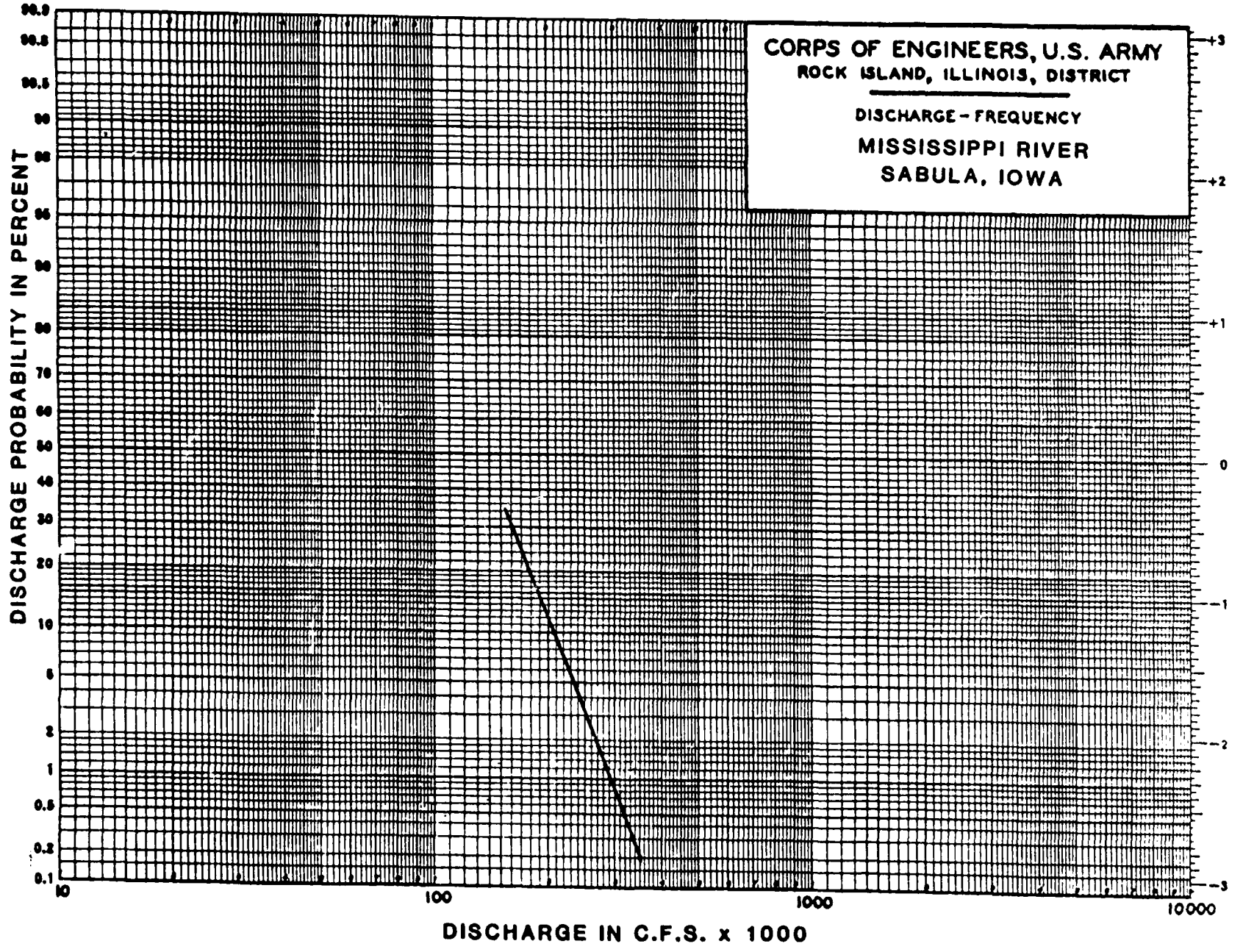
CORPS OF ENGINEERS, U.S. ARMY
ROCK ISLAND, ILLINOIS, DISTRICT
DISCHARGE - FREQUENCY
MISSISSIPPI RIVER
SABULA, IOWA
DISCHARGE PROBABILITY IN PERCENT
99.9
99.8
99.5
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
+3
+2
+1
0
-1
-2
-3
10
100
1000
10000
DISCHARGE IN C.F.S. x 1000

PLATE A-1

SABULA, IOWA

MISSISSIPPI RIVER

FLOOD PROFILES

PLATE A-2

U. S. ARMY
UPPER MISSISSIPPI RIVER
STANDARD FLOOD PROFILES
ROCK ISLAND DISTRICT
DAM NO. 14 POOL 572.0
DAM NO. 13 POOL 563.0
ELEVATION IN FEET ABOVE MEAN SEA LEVEL (1912 ADJUSTMENT)

PLATE A-3

ECONOMIC ANALYSIS

APPENDIX B

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APPENDIX B
ECONOMIC ANALYSIS

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APPENDIX B
ECONOMIC ANALYSIS

DEVELOPMENT AND ECONOMY

GENERAL

The city of Sabula, with a 1989 estimated population of 850, is located on the right bank of the Mississippi River in eastern Iowa. This Jackson County city is served by U.S. Highways 52 and 67 and State Highway 64. The local area economy is agricultural-based, with some commercial and light-industrial enterprises. The nearest industrial center is the Davenport, Iowa-Moline, Illinois, metropolitan area (pop. 380,000), which is located about 50 miles to the south of Sabula.

STUDY AREA

As shown on plate 1 (main report), the study area is located on the Mississippi River mainstem, adjacent to the navigation channel. The study area has a mixture of residential, commercial, and public properties. Businesses represented in the area include gasoline and auto service, banking and financial services, grocery and convenience stores, funeral home, taverns, motel, electrical component assembly, and gift shops. Public properties include police/fire/administration building, library, post office, school buildings, and public works facilities. Table B-1 lists the number and type of properties located within the study area.

TABLE B-1

Study Area Properties
Sabula, Iowa

Type of Property	Number
Residential	297
Commercial	21
Public and Non-Profit [1]	11

[1] Includes churches and service clubs.

SOCIOECONOMIC CONDITIONS

As indicated by table B-2, residents in Sabula are employed primarily in manufacturing, retail trade, professional services, and agriculture. Household income averaged $14,200 in Sabula (1985) compared to $21,800 for the State of Iowa.

TABLE B-2

Labor Force Data - 1985
Sabula, Iowa

Employment Category	Percent Distribution
Manufacturing	38.0
Wholesale and Retail Trade	13.0
Professional and Related Services	13.0
Governmental Employment	5.0
Agriculture	13.0
Transportation and Personal Services	12.0
All Other	6.0

SOURCE:

Claritas Corporation, REZIDE, 1985, The National Encyclopedia of Residential ZIP Code Demography.

HISTORICAL FLOODING

The flood of record at Sabula, Iowa, occurred in April 1965 and was an estimated 85-year event (1.2 percent probability). The existing flood protection project prevented major damages. A major flood occurred in 1969 and was an approximate 20-year event (5 percent probability). Emergency sandbagging was placed on Sabula's downstream riverfront area, which helped to protect against wave-wash damage. This was later covered and seeded for additional permanent flood protection.

METHODOLOGY

The Sabula, Iowa, study area has been analyzed as a single-reach project. Elevation, values, and depth-damage estimates were collected for all

structures in the project area. For the study-area residential structures, ground and first floor elevation, structure type, and estimated repair/replacement values were determined from field survey. Using this information and the standard residential depth-damage computer program, elevation-damage relationships were determined for the properties. For commercial and public properties, historical depth-damage information for types of properties were used to determine damage curves for affected properties (including structure, contents, and cleanup costs). Table B-3 lists damages, by category, for various elevations.

The existing Federal project at Sabula protects the lower elevation areas of the city by use of upstream and downstream flank levees, and a control structure with pump plant. Refer to plate 1. The zero-damage point has been evaluated as the low elevation area on the mainstem river bank.

TABLE B-3

Existing Damages by Category ($1,000's) [1]

Elevation (NGVD)	Frequency (Percent)	Residential	Commercial	Public
596.1	0.80	0	0	0
597.0	0.45	2,740	410	670
598.0	0.25	3,300	660	760
599.0	0.15	4,010	970	860

[1] Includes damages to public and non-profit buildings, parks, roads, and sewers.

AVERAGE ANNUAL DAMAGES

EXISTING DAMAGES

Average annual damages are the expected value of flood losses for any given year. To calculate existing condition average annual damages, depth-damage curves for study area properties were combined with elevation-frequency relationships. Table B-4 summarizes average annual damage by residential, commercial, and public categories.

TABLE B-4

Average Annual Damages ($)

Category	Existing Condition Damages
Residential	$24,800
Commercial	4,600
Public	5,800
Total	$35,200

FUTURE DAMAGES

Due to the level of existing flood protection, future damages within the study area are not a significant consideration and are, therefore, not quantified. Consistent expansion of commercial facilities and damageable property is not evident. Future damages to study area residential contents (affluence factor) also are considered to be insignificant, since the zero-damage point is above the 100-year flood elevation.

AVERAGE ANNUAL BENEFITS

In this report, benefit categories consist of existing flood damage reduction. Benefits accruing to the reduction of flood damages are computed as the difference between "with-project" and "without-project" average annual damages. Table B-5 presents a summary of the benefits and "with-project" damages (residual damages) for the 100-year levee alternative. The summary includes benefits in the freeboard range, which are calculated as one-half the area under the damage-frequency curve between the design level of protection (100-year levee) and the largest flood which might be carried within the freeboard.

TABLE B-5

Average Annual Benefits ($)
Flood Control
100-Year Levee Design

Category	Existing Benefits 1990	Residual Damage	Average Annual Damage
Residential	8,900	15,900	24,800
Commercial	1,400	3,200	4,600
Public	2,200	3,600	5,200
Totals	12,500	22,700	35,200

ECONOMIC SUMMARY

During this study, flood damage reduction measures were investigated. Table B-6 presents a summary economic analysis for the preliminary plans considered in this Initial Appraisal. More detailed descriptions of these plans are presented in the main section of the Initial Appraisal. As indicated by table B-6, the plans studied are not economically feasible. As a Federal interest has not been determined, no analysis of Financial Impact to local sponsors is included.

Tables B-7 and B-8 show calculations for interest during construction and annual charges, respectively. The 100-year levee alternative (Plan A) is used for illustration purposes. Computations employ a discount rate of 8-7/8 percent as mandated for Federal water resource projects, and a 100-year period of analysis. Price levels are January 1990.

TABLE B-6

Preliminary Plans
Summary of Benefits and Costs
(100-Year Evaluation Period, 8-7/8 Percent, January 1990 Prices)

Alternative	Levee (Plan A)	Road Raise & Levee (Plan B)
Design Level	100-year (1%)	100-year (1%)
Total Existing Flood Control Benefits	$ 12,500	$ 12,160
Residential	(8,900)	(8,600)
Commercial	(1,400)	(1,360)
Public	(2,200)	(2,200)
Cost Estimates		
Federal Cost	$579,000	$492,600
Non-Federal Cost	455,400	43,800
Interest During Construction	46,000	23,800
Total Annual Charges	$ 96,900	$ 50,700
Interest and Amortization	(95,900)	(49,700)
Operation and Maintenance	(1,000)	(1,000)
Net Annual Benefits	$(84,400)	$(38,540)
Benefit-to-Cost	0.13	0.24

TABLE B-7
Interest During Construction ($1,000's)
(100-Year Levee Alternative)
January 1990 Prices
8-7/8 Percent Discount Rate

	Year	Construction Costs($)	Time To Base Year	Periods	Interest Factor of $1.00 Deposited	Accumulated Interest
Federal	*	579.0	0.5	(1)	.04437	26.0
Non-Federal	*	455.4	0.5	(1)	.04437	20.0
Totals		1,034.4				46.0

*1-year construction period

TABLE B-8

Summary of Annual Charges
100-Year Levee Alternative
(8-7/8 Percent, January 1990 Prices, 100-Year Life)

Description	Amount ($) Federal	Non-Federal
Estimated Project Cost	579,000	455,400
Interest During Construction	26,000	20,000
Total First Costs	605,000	475,400
Capital Recovery Factor (.08877)	53,700	42,200
Operation and Maintenance	0	1,000
Total Annual Charges	53,700	43,200

Total Federal and Non-Federal Annual Charges $96,900

APPENDIX C

PERTINENT CORRESPONDENCE

INITIAL APPRAISAL

SECTION 205 FLOOD DAMAGE REDUCTION STUDY
MISSISSIPPI RIVER, CITY OF SABULA, IOWA

APPENDIX C
PERTINENT CORRESPONDENCE

TABLE OF CONTENTS

Sabula

Michael Cotton
Chairman

Miles O. Kier
Vice Chair

Charles Hulseberg
Secretary

waterfront commission

Iowa's only city built on an island

July 7, 1989

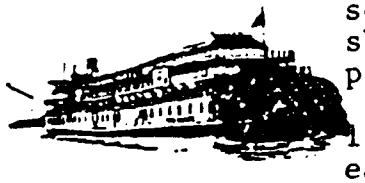
U.S. Army Engineer District, Rock Island
Attn: Planning Division
Clock Tower Bldg. P.O. Box 2004
Rock Island, Illinois 61204-2004

Dear Sir:

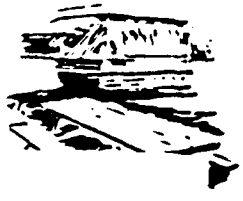
In accordance with the provisions of Section 205 of the Flood Control Act of 1948, as amended, which authorizes the federal government to initiate investigations and studies to be made in the interest of flood control, the Commission hereby makes formal application for a study of the City of Sabula.

The investigations will be conducted in two phases the first phase is the reconnaissance study which be funded by the Corps of Engineers.

The Commission can provide 50 percent of the cost of the second phase, the feasibility study, and one-half of our share may consist of in-kind service. The Commission can provide the following local cooperation and participation.



1. Provide without cost to the United States all land, easements and rights-of-way necessary for the construction of the project.



2. Provide without cost to the United States all necessary relocations and alterations of buildings, utilities, highways, bridges, sewers and related and special facilities.

3. Hold and save the United States free from damages due to the construction and subsequent maintenance of the project, except damages due to the fault or negligence of the United States or its contractors.

4. Maintain and operate the project works after completion without cost to the United States in accordance with regulations prescribed by the Secretary of the Army.

5. Prevent future encroachment which might interfere with proper functioning of the project for flood control.

6. Assume responsibility for all costs in excess of federal cost limitation of 55 million.

7. Provide guidance and leadership in preventing unwise future development of the flood plain by use of appropriate flood plain manangement techniques to reduce flood loss.

8. Provide a minimum cash contribution of 5 percent of the project cost.

9. If the value of the sponsor's contribution above does not exceed 25 percent of the project cost, provide a cash contribution to make the sponsor's total contributions equal to 25 percent.

Respectfully submitted,

Michael Cotton

Michael Cotton, Chair
Sabula Waterfront Commission

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